<table>
<tr><th>Question</th><th>Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>1 (a)</td><td>
<table>
<tr><td>function</td><td>letter from Fig. 4.1</td><td>name</td></tr>
<tr><td>resists the turgor pressure of the cell</td><td>A</td><td>cell wall ;</td></tr>
<tr><td>controls the activities of the cell</td><td>C</td><td>nucleus ;</td></tr>
<tr><td>site of the chemical reactions of the cell including synthesis of proteins</td><td>D</td><td>cytoplasm ;</td></tr>
</table>
</td><td>[3]</td><td>D – ignore ribosome / mitochondria</td></tr>
<tr><td>(b) (i)</td><td>cytoplasm / vacuole, decreases in, size / volume ;

(some) cell membrane / cytoplasm, pulls away / AW, from cell wall ;

plasmolysis / cells are plasmolysed ;

cells, are flaccid / not turgid / lose turgor ;

cell walls no longer, pushed outward / withstand pressure ;</td><td>[ma 3]</td><td>A ‘cell shrinks’
ignore implodes / shrivels up</td></tr>
<tr><td>(ii)</td><td>salt solution has a lower water potential than the cell ; ora

water moves out of the cells, by osmosis ;

down a water potential gradient / from a high(er) water potential to a low(er) water potential ;

through a partially permeable membrane ;</td><td>[max 3]</td><td>ignore ‘water concentration’</td></tr>
</table>

[Total : 9]

2	**(a**	transports, oxygen / gases **;**		[1]	
	(b) (i)	**1** **2** **3**	controls activities in the cell / AW **;** contains, chromosomes / genes / alleles / genetic information / DNA **;** controls how cells, develop / divide / reproduce / grow **;**	max [1]	
	(ii)	more space for haemoglobin **;** to enable greater oxygen carrying capacity / AW **;** more flexible shape (to move through capillaries) **;**		max [1]	

Question		Expected Answers	Marks	Additional Guidance
2 (c) (i)		*0.15 mol dm ^{3}* (red blood cells) are normal shape / biconcave ; *0.20 mol dm ^{3}* (red blood cells) have shrunk / crenation / AW ;	max [2]	
(ii)	**1** **2** **3** **4**	osmosis ; (diffusion / osmosis) of water molecules into cells ; down a water <u>potential</u> gradient / from high water <u>potential</u> (of solution) to low water potential (in cells) ; across partially permeable membrane ;	max [3]	
(iii)		cell wall (offers resistance) ; water potential (of plant cells) could be equal / higher / less negative (than 0.1 M solution) (so no net osmosis) ;	max [1]	
(d) (i)		0.15 mol dm ^{3} ; no net movement of water / (red blood) cells will remain normal shape / AW ;	[2]	units must be included **A (**red blood) cells won't be damaged / isotonic (with solution)
(ii)	**1** **2** **3** **4** **5** **6**	ref to platelets ; fibrinogen converted to fibrin ; soluble to insoluble / fibrin is insoluble ; thrombin / enzyme in context ; mesh / network / web, to trap blood (cells) ; AVP ; e.g. reference to prothrombin or involvement of calcium ions	max [3]	
			[Total: 14]	

3 **(a)**	(group of) cells with similar structure(s) working together to perform a function **;**	[1]	
(b) (i)	(spongy) mesophyll ;	[1]	**ignore** palisade
(ii)	diffusion ;	[1]	
(c)	no chloroplasts / chlorophyll in (root hair cells) ; **ora** root hair cells are not column shaped ; **ora** (root hair cells) have long protrusion / extension / larger surface area ; **ora**	max [2]	**R** root hair cells have hairs

Question		**Marks**	**Additional Guidance**
3 **(d)**	**1** water moves from root cells, into xylem ; **2** cohesion / adhesion AW, of water molecules ; **3** (this) pulls on / creates tension (in water column in xylem) ; **4** Water moves up / through, the xylem ; **5** mass flow of water (in xylem) / transpiration stream ; **6** water moves into leaf by osmosis (from xylem) ; **7** loss of water from leaf (cells) lowers water potential ; **A** ref to water potential gradient **8** evaporation, from surfaces of (mesophyll) cells / into air spaces (in leaf) ;	max [4]	**ignore** method of movement across the root **A** 'stick together', ref to polar **ignore** 'water concentration' **R** 'through stomata'
(e) (i)	more leaf hairs on lower surface ; leaf hairs appear larger on upper surface ;	max [1]	
(ii)	(increased humidity at lower surface) will reduce transpiration rate ; causes lower water demand / less water loss / reduces chances of wilting ; reduced, concentration gradient (water vapour) / water potential gradient ; creates a boundary layer / AW ;	max [2]	less water loss by transpiration = 2 marks.
		[Total:12]	

Question		Mark	Additional Guidance
4 **(a)**	feathers ;	max [1]	
(b)	<table><tr><td>go to 2</td><td></td></tr><tr><td>go to 4</td><td></td></tr><tr><td>*Spinus tristris*</td><td>**D**</td></tr><tr><td>go to 3</td><td></td></tr><tr><td>*Ara ararauna*</td><td>A</td></tr><tr><td>*Aquila chrysaetos*</td><td>**F**</td></tr><tr><td>*Platalea regia*</td><td>**C**</td></tr><tr><td>go to 5</td><td></td></tr><tr><td>*Trochilus polytmus*</td><td>**E**</td></tr><tr><td>go to 6</td><td></td></tr><tr><td>*Recurvirostra americana*</td><td>**G**</td></tr><tr><td>*Phoenicopterus minor*</td><td>**B**</td></tr></table>	[3]	5 or 6 correct = 3 3 or 4 correct = 2 1 or 2 correct = 1

Question		Mark	Additional Guidance
4 (c) (i)	**A –** meiosis ; **B** – zygote ;	[2]	
(ii)	(cell / nucleus) has <u>two</u> sets of chromosomes ; has pairs of chromosomes ; has chromosomes from <u>two</u>, haploid cells / sperm and egg / two gametes ; has chromosomes from male and female (parents) ; has twice the number of chromosomes as the gametes ;	max [1]	**ignore** has 80 chromosomes **ignore** 2n unqualified
(iii)	increase in complexity ; (named) cells / tissue(s) / organ(s) / organ system(s), become specialised / differentiate / AW ;	max [1]	**R** ref to increase in cell number and cell size
(iv)	ref adaptation to, new / changed, environment / habitat / ecosystem ; any example ; e.g. ref to (new) disease / camouflage / escaping from (new) predators allows, selection / evolution ; ref to reduces competition ; increases chances of survival of the species / reduces chance of extinction ; AVP ; e.g. increase in gene pool	max [2]	**A** ref to selective advantage
		[Total: 10]	